

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4]

[1914

XXII.—ON THE PRESENCE OF HYBERNATING
MYCELIUM OF *MACROSPORIUM SOLANI*
IN TOMATO SEED.

G. X. MASSEE.

(WITH PLATE.)

It has long been suspected by tomato growers that the germ of "black-rot" of tomatoes, *Macrosporium solani*, Cke., was carried in the seed, but, so far as I am aware, the actual presence of mycelium in the seed has not been previously demonstrated. When tomatoes are attacked by "black-rot," the seeds often show black spots on the surface. Massee* proved that when such seed was sown, either no germination took place, or else the resulting plants often showed "stripe" disease. Microtome sections of such spotted seed proved the presence of mycelium in varying quantities. In a healthy tomato seed the testa is in close contact with the endosperm, but in an infected seed a thick weft of closely compacted hyphae is present between the testa and the endosperm. When a tomato is badly infected with "black-rot" the mycelium extends deeply beneath the diseased patch, and in many cases the placentas are completely permeated with a dense weft of mycelium, which causes them to become quite black. As would be expected, the seeds borne on these blackened placentas are also often attacked by the mycelium, which enters through the micropyle. The weft of mycelium is sometimes of uniform thickness all round the endosperm, in other instances the thickness of the weft varies at different points, and sometimes it is confined to one or two isolated patches. The hyphae are colourless, septate, and of variable thickness, averaging 4-5 μ . From this peripheral weft of mycelium hyphae pass into the endosperm and also into the embryo. These hyphae are both inter and

* Massee, G. Journ. Board Agric. vol. 13, p. 232 (1906).

intra-cellular, of about the same thickness as the peripheral mycelium, sometimes closely septate, sometimes sparingly so. The hyphae probably dissolve the very thin walls of the cells by means of a ferment, as described by Marshall Ward in his account of the perforation of the cell walls by the *Botrytis* in a "Lily Disease."† When the tip of a hypha comes in contact with a cell-wall it becomes flattened and rather swollen, and a thin portion from the centre of the flattened part in contact with the cell pierces the wall, and swells up at the opposite side to the normal thickness of the hypha. In other instances the hyphae appear to pass through the wall without any preparatory flattening and swelling. No haustoria are present.

On the germination of infected seed, one of two things may happen; either the embryo is killed almost at once by the mycelium, when present in considerable quantity, or the mycelium grows along with the seedling, in whose tissues hyphae can be distinctly traced. In such infected seedlings the "stripe" form of the disease has been produced before the plants were two months old, when grown under favourable conditions for the rapid development of the fungus, namely, an excess of heat and moisture. Sections of diseased seed which had been kept dry for some months, when placed on damp filter-paper in a Petri-dish, were soon surrounded by a copious development of hyphae, showing that the mycelium present in the seed retains its vitality for a considerable period of time.

In many instances, when the seed produced by a diseased tomato does not contain mycelium in its substance, it is surrounded by a weft of hyphae which cannot be removed in the ordinary process of cleaning, being held in position by the dense coat of hairs covering the testa. This external mycelium is also a source of danger, and the only certain means of avoiding disease due to infected seed is to reject all seed produced by diseased fruit, even if it does not show the black spots.

EXPLANATION OF THE PLATE.

- Fig. 1.—Section of portion of a sound tomato seed, showing parts of the coiled embryo (*a*) and endosperm (*b*); $\times 75$.
- „ 2.—Diseased seeds of tomato, showing black patches on the testa; $\times 3$.
- „ 3.—Section of portion of a diseased tomato seed. The mycelium is coloured red.
- „ 4.—Section of portion of a tomato seed showing a weft of mycelium situated between the testa and the endosperm, hyphae from this weft are seen passing into the tissue of the endosperm. Mycelium coloured red. $\times 400$.
- „ 5.—A similar section of fig. 4, showing the mycelium permeating the endosperm. Mycelium coloured red. $\times 400$.
- „ 6.—A strand of mycelium entering into the embryo (*a*) from the endosperm, (*b*) mycelium coloured red. $\times 400$.
- „ 7 and 8.—Methods by which the hyphae pass through the cell-wall. Mycelium coloured red. $\times 400$.

† Ann. Bot., 2, p. 319 (1839).

XXIII.—THE CULTIVATION OF THE SUGAR CANE IN SOUTHERN SPAIN.

The following information concerning the sugar-cane industry in the Province of Andalusia has been supplied to Kew, in reply to our request for information, through the courtesy of H.M. Secretary of State for Foreign affairs:—

Madrid,

SIR,

February 26th, 1914.

In reply to your despatch No. 44 of this series of the 11th of July last I have the honour to forward a report on sugar cane cultivation in Southern Spain which I have received from His Majesty's Consul at Malaga on the subject.

I have the honour to be, &c.,

(Signed) ARTHUR H. HARDINGE.

The Right Hon.

Sir Edward Grey, Bt., K.G., M.P., &c.

British Consulate,
Malaga

February 24, 1914.

SIR,

I have the honour to enclose herewith, as requested, a report on the cultivation of sugar in this Consular District. So far as I have been able to ascertain there are no official or scientific records of the growth of sugar here. The correct names of the canes do not seem to be known to the growers. They are spoken of by descriptive terms. Should it be considered worth while I could no doubt collect samples of the canes from various plantations and send them to England for analysis and classification. The notes from which my report was written were derived from various persons interested in the cultivation of sugar cane, including the manager of a very large estate, holding the position of an agricultural expert. I am, moreover, particularly indebted to Mr. Vice Consul Murison, of Almeria, for a full report on the one surviving plantation in his district.

As will be seen from the report itself, the evidence and opinions expressed are not infrequently at variance; but I have endeavoured to set forth the main facts, and shall not fail to bear the subject in mind for further information if procurable.

I have the honour to be, &c.,

M. VILLIERS,

His Majesty's Ambassador,

H.M.'s Consul.

Madrid.

REPORT ON THE CULTIVATION OF SUGAR CANE ALONG THE SOUTHERN SHORES OF SPAIN WITHIN THE CONSULAR DISTRICT OF MALAGA.

Where grown.—Sugar cane is grown in this district along the southern shores of Spain in the protected valleys where the temperature is never expected to fall below freezing point. In

such plantations the winter temperature usually varies from 6° to 15° C. (42° to 59° Fahr.), although some cultivators report the average temperature as being about 17° C. for the winter and 35° for the summer. The minimum altitude above sea level is given as 15 feet. The plantations extend from Estepona to Adra.

Varieties.—The kinds mentioned as most profitably grown are the White “Blanca,” Violet “Morada,” and Black “Negra.” The “Blanca” is said to be that originally grown by the Arabs, and the “Negra” to have been imported subsequently from Cuba. Others, again, call the “Blanca” “American.” The “Negra” and “Morada” appear to be much the same cane, merely called differently locally, to distinguish the dark from the white.

Other varieties mentioned in the reports I have received are “Crystalline cane,” heavier than the foregoing but very poor in saccharine; a “striped cane,” “of poor quality in every respect”; and the “Algarrobena,” which was previously cultivated, but has been almost entirely set aside.

In some districts where sugar used to be grown, it is not so any longer. This may be partially accounted for by reluctance to persevere with the most suitable kinds when the kind previously grown no longer proved remunerative. In the province of Almeria, for instance, “outside the limited district of Adra no sugar cane is grown in the province. For a few years cultivation of the cane was tried here, but as the result proved in every way unsatisfactory it was given up, now over 20 years ago,” writes the Vice-Consul.

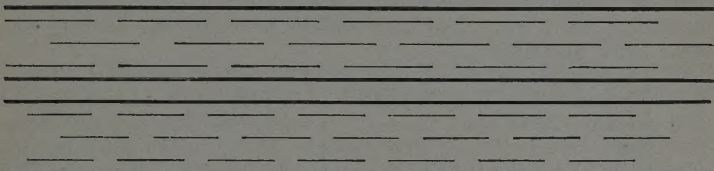
Reasons for preferring certain varieties.—Opinions seem to differ as to the frost-resisting powers of the various kinds. I am told, for instance, as regards the districts of Marbella and Estepona, “the Violet cane is preferred for its strength against frosty weather, the plantation of the white being, therefore, very insignificant.” Whereas the report on the plantations at Adra is, “American white is preferred because . . . it best resists low temperature.”

But there are other questions to consider in planting cane besides the danger of frost, and the consensus of opinion appears to be that the “Negra is preferred on good soil because it is more luxuriant, one crop being gathered each year”; but “Blanca is preferred on poor soil because the crop takes place only once in two years, the growing properties during the second year being extraordinary.” The said poor soil being usually calcareo-silicious. The Vice-Consul at Almeria reports, however, of the Adra plantation, “The American white is preferred because it gives more weight, is richer in saccharine, and (as already quoted) because it best resists low temperature.”

Nature of soil—The soil of the sugar plantations is described as “soft, silicious, with permeable subsoil, naturally rich in nitrogen, on account of being, as a rule, the sedimentations of old rivers.” The Adra plantation, already mentioned, is described as “sediment left when the river overflows its banks during heavy rains; in a few fields is limy, and in one small part is of a sandy nature.”

How planted and how cultivated.—A full description of the method of planting and cultivating has been written by Mr. Vice-Consul Murison (Almeria), as follows:—

(Describing Adra).—The land is first well manured and ploughed. After ploughing it is smoothed or flattened down by a plank or board used as a sort of clod-breaker, on which the driver of the mule stands to give it additional weight. Stable manure is preferred to artificial. After the ploughing and smoothing down, tracks or furrows are made with a grub-hoe, "azada." These tracks are about 33 inches wide by 8 or 9 inches deep. Cuttings of the cane, about 15 inches in length, already in a state of germination through having been covered up for some time, are then laid into them thus:—



The long black lines represent the sides of the beds (tracks or furrows), while the short lines denote the cuttings.

Three parallel lines of cuttings being placed in a track, and the cuttings are so arranged that the interstices of each row come opposite the centres of the cuttings in other rows.

These cuttings are then slightly covered with earth from the sides, and as growth continues the covering up is completed till the whole be quite flat as before the tracks were formed. During this period the land is kept free of weeds. On the flattening and weeding being completed guano or artificial manure is applied. This manuring generally takes place from the 15th to the 20th July until the 15th of August. Special care is taken before the final covering up and the application of the manure that every weed has been removed. Immediately after manuring (fertilising) the fields are irrigated and successive irrigations are given every 15 or 20 days till the period for cutting commences.

Replanting takes place every 10 or 12 years, the land, before the plants are put in, undergoing a thorough trenching with the grub-hoe, so as to bring new earth to the surface. (Others state that replanting should take place every 7 or 8 years.)

Fertilising.—In recent years additional attention has been given to the question of chemical manures or fertilisers, according to the requirements and nature of the soil. A mixture said now to be much in use has the following guaranteed richness in radicals:—

Ammonic and nitric nitrogen—7-8 per cent.

Potas. anh.—10 per cent.

Phosphoric acid—10 per cent.

This is applied once or twice during the growth and ripening of the cane in tremendous quantities, as much as $1\frac{1}{2}$ tons for $2\frac{1}{2}$ acres (1500 kgs. per hectare).

Irrigation.—Irrigation should be resorted to every 15 or 20

days during the summer; and during the winter, that is the time of year when rain falls, whenever considered necessary. When plantations are situated on the banks of a river every effort is made to get the fine sediment brought down by the river when in flood well spread over the land.

Irrigation is by means of the old-fashioned conduit system. The plant, especially as it matures, needs water naturally in considerable quantities, and more particularly when chemical manure has been applied, in order that it may be gradually and readily absorbed by the small roots.

Season for planting and crop.—Planting takes place in the spring, the precise time varying here between March, April and May, each of these months being considered "the best," an opinion properly formed locally and based upon the variation of soil, site, etc., etc. The crop should be ready for cutting one year after planting.

Average yield.—The average yield is said to be about 40 tons for $2\frac{1}{2}$ acres. The crop from the Adra plantation is stated to be 200 arrobas (2300 kgs.) from a "marjal," or 525 square metres for the "tercio" or first year's cane, and 300 arrobas (3450 kilgs.) for the "Alija" or second year. This statement also shows the great increase of the second-year crop over the first. The density of juice is stated to be "8 degrees Beaumet," or "about" 14 per cent. of the output of cane, for the district generally"; whereas at Adra "the average yield of sugar is said to be "8 per cent."

XXIV.—DECADES KEWENSES

PLANTARUM NOVARUM IN HORTI REGII CONSERVATARUM.

DECAS LXXVII.

761. *Clematis Rehderiana*, Craib [Ranunculaceae-Clematideae]; a *C. nutante*, Royle, filamentis pubescentibus recedit.

Frutex scandens; ramuli primo sericei, mox sparse crispatis pubescentes, sulcati. *Folia* pinnata, petiolo usque ad 6.3 cm. longo, indumento ramulorum suffulta; foliola 3-4-juga, ambitu late ovata vel juniora ovato-lanceolata, apice acute acuminata, basi saepissime cordata, usque ad 7 cm. longa et 5.5 cm. lata, saepius trilobata, rarius latere uno fere usque ad basin secta, grosse dentata, dentibus mucronatis, chartacea vel tenuiter chartacea, subtus pallidiora, pagina superiore pilis albidis adpressis plus minusve deciduis instructa, inferiore densius molliter subsericea, e basi trinervata, nervis supra demum saepe immersis subtus prominentibus, petiolulis ad 2.2 cm. longis suffulta. *Inflorescentia* axillaris, paniculata, satis compacta, pedunculo communi usque ad 10.5 cm. longo primo densius adpresse albobescente mox parce crispatis pubescente sulcato suffulta; ramuli inferiores usque ad 5 cm. longi, interdum bractea foliacea trilobata instructi; bractee ramulorum superiorum membranaceae, pallidae, integrae vel apice tridentatae, plerumque circiter 1.5 cm. longae; pedicelli circiter 7-8 mm. longi. *Sepala*

1·7 cm. longa, 5·5 mm. lata, apice saepe reflexa, inferne plus minusve cohaerentia, extra pilosa, intus glabra. *Filamenta* 1 cm. longa, ima basi glabra, ceterum tenuiter pilosa, antheris 2·5 mm. longis muticis. *Ovarium* sericeum, stylo plumoso circiter 1 cm. longo. *C. nutans*, Beckett in Gard. Chron. vol. xlviii. p. 310 f. 129; Bean in Kew Bull. 1910 p. 392, vix Royle. ?*C. Buchananiana*, Finet et Gagnep. in Bull. Soc. Bot. Fr. sér. 4, vol. iii. p. 541; Contrib. Fl. As. Or. vol. i. p. 26. *C. Buchaniana*, var. *vitifolia*, Bois in Journ. Soc. Hort. Fr. sér. 4, vol. i. p. 866; L. Henry in Rev. Hort. 1905, p. 437, fig. 180. *C. nutans*, var. *thyrsoides*, Rehder et Wilson in Sargent Pl. Wilson, vol. i. p. 324, excl. Wilson 1422 (seed number).

CHINA. Western Szechuan, Tachienlu, Wilson 3120, 3120A, 2120B. (Veitch Expedition), Soulié 450, Pratt 592 pro parte. Cult. Hort. Kew (211-04, Lemoine type).

762. **Clematis Veitchiana**, Craib [Ranunculaceae—Clematideae]; a *C. Rehderiana*, Craib, foliis gracilioribus bipinnatis, bracteis parvis recedit.

Frutex scandens; ramuli primo sericei, mox parce subadpresse pubescentes, sulcati. *Folia* bipinnata, petiolo communi ad 5·2 cm. longo indumento ut ramulis suffulta; pinnae ad 4-jugae, trifoliatæ vel rarius pro pinnis inferioribus foliola trilobata tantum; foliola saepius ovata vel ovato-lanceolata, apice acute acuminata, basi late cuneata, rotundata, truncata vel leviter cordata, usque ad 5 cm. longa et fere 3 cm. lata, chartacea vel tenuiter chartacea, pagina utraque demum pilis albis adpressis hic illic sed nervis pagina inferiore densius instructa, nervis supra impressis subtus prominentibus, saepe trilobata, margine grosse dentata, dentibus mucronato-acuminatis. *Inflorescentia* axillaris, laxiuscula, pedunculo communi circiter 7 cm. longo sparse crispatis pubescente sulcato suffulta; pedunculi ramulorum inferiorum 3 cm. longitudine vix attingentes; pedicelli graciles, ad 2 cm. longi; bractee omnes parvae. *Sepala* 1·5 cm. longa, 5·5 mm. lata, extra pilosa, intus glabra, ciliata. *Filamenta* tenuiter pilosa. *Ovarium* sericeum, stylo plumoso circiter 1·1 cm. longo. *C. nutans*, var. *thyrsoides*, Rehder et Wilson in Sargent Pl. Wilson, vol. i. p. 324 quoad Wilson 1422 (seed number).

Cult. Hort. Kew e seminibus a Wilson in China occ. lectis. (641-10 Veitch).

763. **Xylosma Aquifolium**, Sprague [Flacourtiaceae]; affinis *X. orbiculato*, Seem., a quo foliis iis *Ilicis Aquifolii*, Linn., similibus, carpellis 6-7 distinguitur.

Ramuli cinerei, glabri, 3-4 mm. diametro 12-15 cm. infra apicem. *Folia* heteromorpha, ea ramulorum sterilium oblonga, utrinque angustata, 9-11 cm. longa, 3·5-4·5 cm. lata, apice acuta, basi obtusa vel rotundata, valde spinoso-dentata, ea ramulorum fertilium elliptico-oblonga, elliptica vel ovata, apice acuta vel saepius obtusa, 5-8 cm. longa, 2·5-4 cm. lata, espinulosa, dentibus parvis paucioribus vel interdum omnino deficientibus; folia omnia rigide coriacea, glabra, pagina superiore basi utrinque glandulæ fera, nervis laterilibus majoribus utraque latere costae

6-7, exsiccando utrinque praesertim subtus prominentibus, rete venularum supra prominulo subtus prominente; petioli 6-8 mm. longi, supra leviter excavati; stipulae minutae, triangulares. *Racemi* in axillis superioribus orti, circiter 2 cm. longi, ad 6-flori; bracteae oblongae, 5-7 mm. longae; pedicelli 4-5 mm. longi. *Sepala* 7-11, imbricata, late ovata, cuspidata, 2 mm. longa et lata, extra glabra intus velutina. *Staminodia* pauca vel nulla, ad 3 mm. longa; antherae effoetae late ovatae. *Discus* e glandulis numerosis oblongis contiguis constans. *Ovarium* subglobosum, 3 mm. diametro, glabrum, 1-loculare septis 6-7 valde intrusis; styli 6-7, crassi, cum stigmate capitato 1.5 mm. longi; ovula circiter 5, ascendunt. *Fructus* depresso-globozus, exsuccus, indehiscens, circiter 2 cm. diametro, septis persistentibus, stylis persistentibus coronatus.

HAB. UNKNOWN. Described from specimens received from the Curator, Botanic Gardens, Melbourne, where the species is cultivated. Well distinguished by its holly-like foliage, the pair of glands at the base of the blade, the short racemes, and the hexamerous or heptamerous ovary.* Its nearest ally seems to be the Fijian plant described by Seemann, *Flora Vitiensis*, p. 7, under the name *Xylosma orbiculatum*. This has large orbicular or ovate leaves, and is probably specifically distinct from *X. orbiculatum*, Forst., a native of Savage Island, which has small obovate leaves.

764. *Dunbaria gracilipes*, Lace [Leguminosae-Phaseoleae]; a *D. conspersa*, Benth., pedicellis longis gracilibus facile distinguenda.

Caules sublignosi, volubiles, graciles, tenuiter canaliculati, densius puberuli. *Folia* trifoliolata, petiolo communi usque ad 4 cm. longo supra canaliculato infra parum sulcato indumento ut caulibus tecto suffulta; stipulae persistentes, lineari-lanceolatae, saepissime reflexae, circiter 3 mm. longae; foliola lateralía inaequilatera, latere altero dimidiatim rhomboideo-ovata, altero lanceolata vel ovato-lanceolata, apice acute acuminata, basi saepissime magis minusve rotundata, ad 5.6 cm. longa et 3.2 cm. lata, terminalia usque ad 1.3 cm. a lateralibus distantia, rhomboidea lateve rhomboidea, apice acute acuminata, basi obtuse cuneata ad rotundato-cuneata, ad 6.7 cm. longa et 5.7 cm. lata, omnia membranaceo-chartacea, supra tenuiter puberula, subtus pallidiora, densius breviter molliter pubescentia glandulosaque, e basi trinervia, nervis secundariis (e costa ortis) utrinque 2-3 pagina utraque prominentibus, nervis transversis infra prominulis, dense ciliolata; petioluli circiter 2 mm. longi; stipellae deficientes. *Racemi* ad 7.5 cm. longi, pedunculo communi 5.5 cm. longitudinis attingente indumento ut caule suffulti; pedicelli ad 1.8 cm. longi, pubescentes glandulosique; bracteae ante anthesin deciduae, oblongo-ovatae, acuminatae, ad 1 cm. longae, utrinque puberulae. *Calyx* 7-10 mm. longus, extra pubescens glandulosusque, tubo intus fere glabro; lobus infimus lanceolatus, acuminatus, alios longe superans; lobi duo supremi fere ad apicem connati, partibus liberis setaceis, omnes ciliati. *Verillum* vivum atropurpureum, rotundatum, emarginatum,

auriculatum, 1 cm. longum, 1.5 cm. latum, glabrum, stipite 0.5 cm. longo puberulo suffultum; alae vivae albae, purpureo-suffusae, oblongae, apice rotundatae, ad 8 mm. longae, auricula lineari obtusa 1.5 mm. longa basi instructae, stipite gracillimo 3-4 mm. longo suffultae; carina viva alba, inflata, in rostrum purpureum decurvum obtusum subito contracta, circiter 1.2 cm. longa, stipite 6 mm. longo suffultae. *Stamen* vexillare liberum. *Stylus* basi pubescens. *Legumen* (vix maturum), sessile, compressum, 5 cm. longum, 6-7 mm. latum, basi angustatum, apiculatum, marginibus incrassatis, pilis brevibus albis glandulisque dense tectum, 8-9-spermum.

INDO-CHINA. Upper Burma: near Maymyo, Ani Sakan, 900 m., *Lace* 5494.

765. **Anogeissus coronata**, *Stapf* [Combretaceae]; affinis *A. Bentii*, Baker, sed foliis rotundis vel fere obcordatis, receptaculo undique pubescente, fructus alis latioribus insigniter crispo-undulatis denticulatisve distincta.

Frutex vel *arbor* (?), ramulis pubescentibus vel subtomentellis, vetustis cortice pallido tectis. *Folia* rotunda vel late obovato-rotundata vel fere obcordata, mucronulata vel apiculata, 8-18 mm. longa, 10-18 mm. lata, utrinque tenuiter incano pubescentia, nervis lateralibus subtus prominulis utrinque circiter 4 obliquis versus marginem subito prorsus curvatis; petioli 1-2 mm. longi, tomentelli. *Capituli* pedunculo tomentello 1-2 cm. longo suffulti, sub anthesi 1-1.2 cm. diametro. *Receptaculi* tubus 3-4 mm. longus, basi iam sub anthesi alatum dilatatus, praeter alas fulvo-pubescentis, limbus cupularis, 5-dentatus, 2-2.25 mm. diametro, extra intraque fulvo-pubescentis, diu persistens, disci squamae rotundatae, longe pilosae. *Fructus* late alatus, cum alis glabris margine crispo-undulatis denticulatisve 6-7 mm. latus, 3 mm. altus, receptaculo persistente coronatus.

INDIA. Rajputana: Merwara, in forests, *Duthie* 4663.

766. **Ardisia gracilis**, *Lace* [Myrsinaceae-Eumyrsineae]; ab affini *A. pauciflora*, Heyne, pedunculis pedicellisque longioribus facile distinguenda.

Fruticulus erectus, ramulis juventute lepidotis mox cortice cinereo-brunneo irregulariter striato obtectis. *Folia* lanceolata, obtuse plerumque inconspicue acuminata, basi in petiolum angustata, usque ad 11 cm. longa et 2.8 cm. lata, matura chartacea, juniora tenuiora, glabra, infra parum pallidiora, glandulis parvis numerosis aequaliter distributis, costa pagina superiore impressa inferiore prominente, nervis lateralibus inconspicuis, margine integro parum recurvo; petioli 0.5-1 cm. longi, supra late haud altius canaliculati, glabri. *Inflorescentia* axillaris, gracilis, plerumque cernua, e racemis 2-4 floris umbelliformibus constituta, basi folio parvo cito deciduo induta; pedunculus communis 2-4 cm. longus; pedicelli 1.7-2.5 cm. longi, parce ferrugineo-puberuli; bracteae angustae, circiter 1 mm. longae; alabastra ovoidea, acuminata. *Calyx* circiter ad medium 5-lobatus, ferrugineo-puberulus, lobis deltoideis obtusis 1 mm. longis. *Corolla* viva pallide punicea, circiter 1 cm. diametro,

tubo calyci subaequilongo, lobis ovatis acuminatis reflexis 0.5 cm. longis glandulosis. *Filamenta* brevissima; antherae ovatae, acute acuminatae, circiter 3 mm. longae, dorso atroglandulosae. *Stylus* glaber, stamina circiter 2 mm. superans. *Fructus* immaturus, globosus, glaber.

INDO-CHINA. Burma: Tenasserim, Dawna Range, 1050-1800 m., *Lace* 4627, 5624, *Beddome* 114.

767. **Cotylanthera caerulea**, *Lace* [Gentianaceae-Exaceae]; ab affini *C. paucisquamae*, C. B. Clarke, nodis 6-9 brevioribus, corollae lobis brevioribus recedit.

Herba saprophytica, 4.5-8.5 cm. alta, caule solitario erecto carnosio stramineo glabro nodis 6-9. *Folia* ad squamas oppositas deltoideas acuminatas circiter 2 mm. longas reducta. *Flores* solitarii, terminales, vivi pallide caerulei. *Calyx* 2.75 mm. longus, lobis imbricatis subovatis obtusis 1.5 mm. longis basi usque ad 2 mm. latis. *Corollae* tubus 1.5 mm. longus; lobi 4, ligulati, obtusi, 3.5 mm. longi, 1.5 mm. lati. *Filamenta* 1.25 mm. longa, glabra, antheris 1.5 mm. longis poro apicali dehiscentibus. *Stylus* glaber, stamina paululo superans.

INDO-CHINA. Upper Burma: Maymyo, 1050 m., *Lace* 5898.

768. **Thunbergia maculata**, *Lace* [Acanthaceae-Thunbergiaeae]; ab affini *T. lutea*, T. And., floribus majoribus maculatis, bracteolis intus calyceque haud glabris recedit.

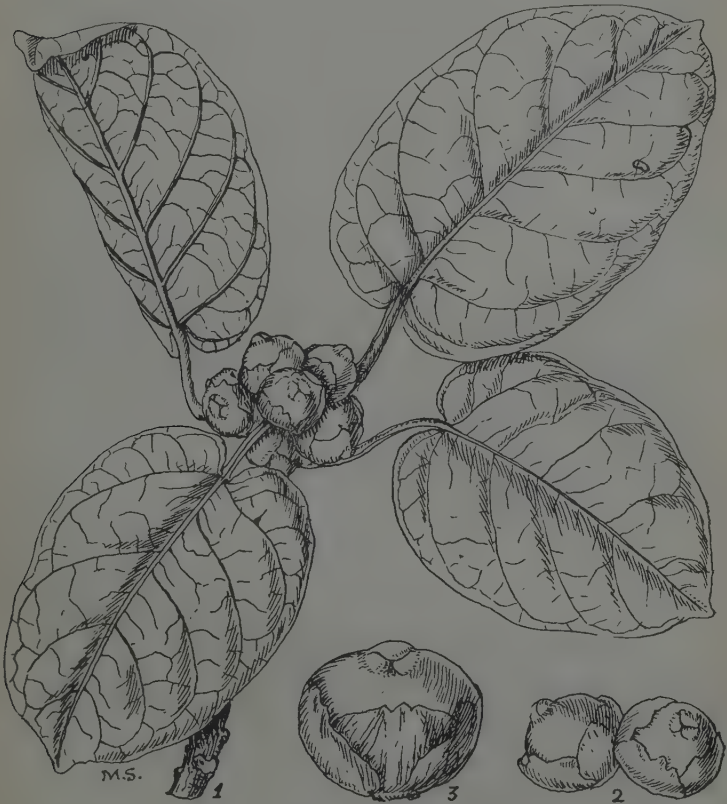
Caules herbacei, volubiles, sulcati, glabri nisi ad nodos ubi linea pilorum alborum rigidorum instructi. *Folia* ovata ad oblongo-elliptica, apice longius acute acuminata, basi acuminata, 8-13 cm. longa, 3.5-6.5 cm. lata, tenuiter, chartacea, pagina superiore pilis rigidiusculis hic illic instructa, inferiore pallidiora glabraque, nervis lateralibus utrinque 3-4 arcuatis supra prominulis subtus prominentibus, nervulis uti reticulatione laxa subtus conspicuis, distanter brevissime denticulata; petioli 1.5-4.5 cm. longi, foliorum oppositorum saepe parum inaequales, supra canaliculati, glabri. *Flores* axillares, solitarii, pedicellis 4-8 cm. longis glabris parum sulcatis suffulti; bracteolae binae, orbiculares, breviter apiculatae, 2 cm. diametro, nervis distinctis, extra glabrae, intus pilis brevibus brunneis glandulosis tectae, inferne circiter ad medium connatae. *Calyx* brevius denticulatus, pilis longiusculis brunneis glandulosis tectus. *Corolla* extensa usque ad 5.3 cm. longa, viva extra pallide straminea, intus maculis elongatis plus minusve in lineas dispositis ornata; lobi inter se subaequales, rotundati, ciliati. *Stamina* inclusa, filamentis glabris; antherae acuminatae, 6 mm. (acumine 2 mm. longo excluso) longae, acumine pilis longiusculis erectis transverse septatis penicellato; locus quisque appendicula oblonga pallida circiter 2 mm. longa ciliata instructus. *Discus* parvus, carnosus. *Ovarium* glabrum, circiter 2 mm. altum; stylus fere 2 cm. longus, glaber, breviter 2-lobatus. *Capsula* generi conformis, glabra, 3 cm. longa, basi 1.5 cm. diametro.

INDO-CHINA. Burma: Ruby Mine District, near Mogok, c. 1200 m., *Lace* 6000.

769. **Ficus (Urostigma) cupulata**, *Haines* [Urticaceae-Artocarpeae]; *F. tomentosae*, Roxb., affinis, a qua differt habitu,

foliis siccatis supra minute reticulatis pubescentibus autem non minute tuberculatis (in *F. tomentosa* folia siccata supra glabra minute tuberculata sunt vel raro levissima sed nunquam reticulata), etiam differt receptaculo maturo purpureo, receptaculi bracteis basalibus et operculatis majoribus et floris maris perianthio gamophyllo (in *F. tomentosa* 4 sepalorum perianthium est fide King).

Arbor fruticosa 2-4 m. alta, cortice cinereo rugosissimo, ramulis foliisque novis tomentosis. *Folia* ovata, obtuse cuspidata, basi cordata, 10-13 cm. longa, 5-nervosa, utrinque minute reticulatissima et perpetuo plus minus pubescentia vel puberula, nervis lateralibus supra basin 4-6 paribus intra marginem vinetis: petioli 3-4 cm. longi. *Receptacula* subglobosa, leviter umbonata,



1-1.1 cm. diametro, juventute tomentosa, maturitate purpurea. bracteis 3 pilosis latissimis 2-3-lobatis multo imbricatis receptaculi dimidium vel ultra amplectentibus. *Floris* maris perianthium gamophyllum, stamine brevius. *Floris* feminae sepalia 3-4.

INDIA. Central Provinces: on sandstone rocks about Pach-

marhi, *Haines* 3556. Growing together with *Ficus bengalensis* and *F. tomentosa*, its nearest allies, from which it is at once easily distinguishable by the much-branched shrubby habit, and by the absence of aerial roots, in addition to the characters given above. It also lacks the curious longitudinal gland found on the midrib beneath the leaf of *F. tomentosa*, which is present in about 50 per cent. of the *F. tomentosa* leaves examined, but is not very evident in dried specimens. The name is suggested by the cup-like form of the basal bracts of the receptacle.

770. **Chamaedorea nana**, *N. E. Brown* [Palmae-Arecaceae]; affinis *C. tenellae*, Wendl., sed foliis majoribus confertioribus subglaucis, spathis superioribus pedunculo vix aequalibus, spadicebus masculis ramosis, floribus viridibus et petalis liberis differt.

Planta 30–60 cm. alta, omnino glabra. *Caulis* simplex, 1.3–1.4 cm. crassus, annulis 0.5–1 cm. distantibus notatus. *Folia* simplicia; petiolus 7.5–9 cm. longus, fere vel usque ad apicem vaginatus, apice 4–5 mm. crassus; lamina subobovato-elliptica, ad medium bifida, lobis acutis, leviter glaucescens, costae utrinque circa 11–nerviis, marginibus exterioribus serrato-dentatis. *Pedunculi* axillares, solitarii, 15–20 cm. longi, 2.5–4 mm. crassi, spathis vel vaginibus 5 tubulosis acutis vestiti. *Spatha* suprema pedunculo non excedens. *Spadix* masculus ramosus, ramis 4–7 recurvato-pendulis simplicibus usque ad 15 cm. longis; femineus simplex, recurvatus, viridis. *Flores* sublaxe spicati; masculi oblongi, 4 mm. longi, virides, basi lutei, calyce cupuliformi subtrilobo 1 mm. longo, petalis liberis oblongis apice incurvatis acutis, staminibus petalis duplo brevioribus ovario rudimentario subaequalibus; feminei subglobosi, 2.5 mm. diametro, virides, petalis ellipticis vel suborbiculatis obtusis concavis, ovario globoso, stylo 0.5 mm. longo, stigmatibus integro.

CENTRAL AMERICA. Costa Rica: Described from a plant received at Kew from Messrs. Sander and Sons. This plant was introduced from Costa Rica by Messrs. Sander and Sons, and has been distributed by them under the name of *C. pumila*, but it is quite distinct from that species in its dwarfer habit, smaller leaves, shorter petioles, &c., and comes from a different country.

XXV.—FUNGI EXOTICI : XVIII.

Eight new fungi are described in the present instalment. Of these, two are new species of *Aspergillus* taken from the soil at the Central Research Farm, Khartoum, by Mr. R. E. Massey, and sent by him in pure culture to Kew. Two other known species of *Aspergillus* were also found in the tubes sent. Two new fungi are recorded from Malaya, one, *Cypella heveae*, being said to be undoubtedly parasitic on *Hevea brasiliensis*, the other *Botrytis necans*, parasitic on the moth *Brachartona catoxantha*.

A serious banana disease has been reported from the island of Viti Levu, Fiji, by Mr. C. H. Knowles, Superintendent of Agriculture, which from the material sent to Kew proves to be due to a new species of *Cercospora*.

POLYPORACEAE.

Polyporus (Lentus) raphanipes, Wakefield.

Mesopus. *Pileus* glaber, alutaceus, ad 3.5 cm. diametro (in sicco), centro umbilicatus, brunneo-tinctus, marginem versus leviter adpresse fibrillosus, margine ciliato. *Pori* minuti, albidii. *Stipes* rufescens, primo leviter pruinatus, medio 1.5 mm. crassus, sursum in pileum expansus, deorsum abrupte incrassatus, basi fusiformi radicata; pars supera ad 2.5 cm. longa, pars fusiformis circiter 2-2.5 cm. longa, 5-7 mm. crassa. *Sporae* ellipsoideae, hyalinae, $5-7 \times 3 \mu$.

NIGERIA. Northern provinces, *J. S. Macfie* 6E, September, 1910.

PORTUGUESE EAST AFRICA. Zumbo, *A. Cruz*. Received in 1913, through the Rev. C. Torrend.

The Nigerian specimen was previously referred somewhat doubtfully to *Polyporus Tricholoma*, Mont. (*K.B.* 1912, p. 142). The specimen from Zumbo, however, shows the same distinctly swollen base, and the African plant appears to be a good species, distinguished from the American *P. Tricholoma* by this character, and also by the slightly more fleshy pileus.

No notes are given with either of the collections, but the plant appears to have grown on buried wood, and to have reached the surface of the soil by means of the swollen sclerotium-like base, such as occurs in some species of *Collybia*. In the moist state the plant is somewhat larger than the measurements given above, which are taken from dried specimens, and the distinction between the upper part of the stem and the swollen base is not so abrupt.

Polyporus australiensis, Wakefield.

Sessilis, basi incrassata. *Pileus* carnosus, semiorbicularis, 5-10 cm. (vel ultra) diametro, medio 1-2 cm. crassus, basin versus ad 3 cm. crassus; cuticula levis, laete aurantiaca vel rubidotincta, vegeto carnosa (ut videtur), sicco cartilaginea, interdum contracta, interstitiis pallidioribus. *Pori* concolores, carnosii, siccitate contracti, circa 1 mm. diametro, 2-9 mm. longi (in sicco). *Caro* pororum longitudine duplo vel quadruplo crassior, pallide luteo-aurantiaca. *Sporae* non visae.

AUSTRALIA. Queensland: Coomera River, on logs, *C. T. White* (received through Mr. F. M. Bailey); Toowoomba, Grampians, *Sullivan* (in Herb. Kew as *P. portentosus*, B.); Geographie Bay (in Herb. Kew as *P. stypticus*, Fr.). Victoria: *Campbell* (in Herb. Kew as *P. retiporus*, Cke.).

A very distinct species, near to *P. sulphureus*, and said to have a very strong odour when fresh. It differs from *P. portentosus*, *retiporus*, and *stypticus*, with which it was confused in the early records quoted above, in the brilliant orange-yellow tints in pileus and pores, and in the yellowish flesh (*Ridgway*, tab. III, 15f).

THELEPHORACEAE.

Cyphella heveae, Massee.

Cupulae minutae, 0.5 mm. diametro, sparsae vel gregariae sessiles, udae cupulato-expansae, orbiculares, siccae, subglobose contractae, extus minutissime ac late puberulae, melleae,

Hymenium, glaberrimum, subroseo-albescens. *Sporae*, ellipticae, hyalinae, $7-8 \times 5 \mu$.

MALAYA. Wellesley: on bark of *Hevea*. R. M. Richard.

This species is said to be undoubtedly parasitic on *Hevea*. Allied to *Cyphella villosa*, Karst.

PYRENOMYCETES.

Scirrha Cyperi, Wakefield.

Stromata gregaria, oblonga, epidermide diu tecta, dein erumpentia, atra, 1-4 mm. longa. *Ostiola* prominentia. *Perithecia* in unae vel duam seri lineare disposita, ad 200μ diametro. *Asci*, clavati, $65-75 \times 8-9 \mu$, octospori; paraphyses filiformes. *Sporae* subdistichae, hyalinae, fusoideae, subcurvulae, primo guttulate, dein 1-septatae, ad septa non vel vix constrictae, $17-18 \times 4 \mu$.

QUEENSLAND. Nudgee: forming conspicuous, raised, blackish pustules on stems and leaves of *Cyperus polystachyus*, C. F. White, 1913.

Sphaerella vexans, Massee.

Perithecia gregaria, globulosa, minutissima, subepidermica, ostiolo vix prominulo ornata, atra, $60-70 \mu$ diametro. *Asci* cylindracei, deorsum breve attenuato-stipitati, octospori, paraphysati. *Sporae* ellipsoideae, utrinque obtuse rotundatae, medio 1-septatae, hyalinae, $8-9 \times 3 \mu$.

ZANZIBAR. On living trees of *Eugenia caryophyllata*. F. McClellan.

DEUTEROMYCETES.

Aspergillus Koningi, Oud.

SUDAN. Appeared in a culture of fungi from soil near Khartoum, R. E. Massey 2 and 5.

Forming a thin olive-coloured stratum on the culture medium. Has been previously isolated from soil in Holland.

Aspergillus pusillus, Massee.

Maculae effusae, majusculae, griseae. Hyphae steriles, repentes, parce septulatae, hyalinae, longissimae; fertiles erectae, rectae, hyalinae, continuac, $50-75 \times 3-4 \mu$, apice vesiculoso-inflatae, $10-12 \mu$ diametro. Sterigmata cylindracea, $3 \times 1 \mu$. Conidia catenulata, globosa, levia, sub lente hyalina, 1μ diametro.

SUDAN. A pure culture taken from soil near Khartoum, R. E. Massey 3 and 4.

Forming a somewhat large, grey, spreading patch on the culture medium. Distinguished by the very small size of every part of the fungus.

Aspergillus cervinus, Massee.

Maculae indeterminatae, pallide cervinae. Hyphae steriles effusae, ramosae, septatae, repentes; fertiles erectae, sparse septatae, hyalinae, magnitudine maxime ludentes, $80-350 \times 8-10 \mu$ apice inflato-vesiculosae. Sterigmatia cylindracea, obtusiuscula, $7-8 \times 3 \mu$. Conidia catenulata, globosa, levia, sub lente hyalina, 2μ diametro.

SUDAN. A pure culture taken from the soil, near Khartoum, *R. E. Massey* 6.

Forming a thin, effused, pale fawn-coloured stratum on the culture medium. Allied to *Aspergillus nanus* Mont.

***Aspergillus calyptratus*, Oud.**

SUDAN. Obtained as a pure culture from soil near Khartoum, *R. E. Massey* 1.

A well-marked species, characterised by the cylindrical, elongated head, formed of crowded chains of spores. Has previously been isolated from soil in Holland.

***Botrytis necans*, Massee.**

Hyphae steriles repentis, larvas demum omnino obducentes, fertiles vage ramosae, sparse septatae, subhyaline. *Conidia* in ramulorum vel denticulorum apicibus acrogena, solitaria, globosa, hyalina, $4\ \mu$ diametro, numerosissima.

SINGAPORE. On larvae of *Brachartona catowantha*. Botanic Gardens, *I. H. Burkill*.

In a note Mr. Burkill states, "A fungus is doing for us yeoman service in checking an outbreak of the moth *Brachartona catowantha*." An account of the moth is given in Bulletin No. 4 of the Federated Malay States Department of Agriculture.

***Cercospora musae*, Massee.**

Maculae orbiculares vel lineares, determinatae, amphigenae, sordide fusco cinerascens, 3-6 mm. diametro; pulvinuli hypophylli, totam maculam vestientes, olivacei. *Hyphae* breviusculae, contorto-nodulosae, interdum furcatae, olivaceae, septatae. *Sporae* praelongae, vermiculariae, leniter curvulae vel flexuosae, non vel parci septulatae, $60-75 \times 7-8\ \mu$.

POLYNESIA. Fiji Islands: Viti Levu; Sigatoka. On living banana leaves, *C. H. Knowles*.

This species is considered to be the cause of a serious disease in the banana plantations in the Sigatoka district of the island of Viti Levu, Fiji. Leaves that become infected fall quite early in the season. The lowest leaf as a rule is attacked first, the leaves being infected in ascending succession.

XXVI.—THE SEX OF DATE PALM SEEDLINGS.

Attention has recently been drawn to a belief held by the Arabs that it is possible by artificial means to change the sex of seedling Date Palms and to convert male into female trees.

Reference to this belief will be found in Popenoe's recently-published book on the Date Palm,* and a note was also printed in the Gardeners' Chronicle† early in the year in connection with an article which appeared in the Tropical Agriculturist‡ of Ceylon on the subject.

* Date-Growing in the Old and New Worlds. Paul B. Popenoe, p. 123.

† Gard. Chron. Dec. 1913, lv. p. 57.

‡ Trop. Agric. Dec. 1913, xli. p. 482.

The story in which interest has again been aroused is, however, no new one, for it was first brought to the notice of European readers as long ago as the year 1901, when Professor Schweinfurth published an article on "The Cultivation of the Date Palm" in *Gartenflora**. From this original source the account of the supposed change of sex has been somewhat widely, if sporadically propagated.

It re-appeared in *Le Jardin* of June 20th, 1902 (p. 177), without any acknowledgment of its source, and thence it has been copied into numerous *Agricultural Journals*, etc., becoming considerably modified in the course of years.

It will be seen from information kindly supplied to Kew by Mr. G. St. C. Feilden, Chief Gardener to the City of Cairo, that the Arabs believe that the sex of young date palms may be changed under certain conditions; but that these beliefs rest on any adequate basis of fact seems to be highly improbable.

It is alleged, however, that it is possible to tell the sex of seedling date palms before the young plants have flowered, and the information given may be of use to those who contemplate making a date plantation from seed.

Whether there be any truth underlying these Arab beliefs in the possibility of turning male date palms into female or not is really only a matter of minor importance from the economic point of view since, as Professor Schweinfurth points out in a letter sent to Mr. Feilden, the date palm is propagated almost entirely by the offshoots formed at the base of the palm. For not only is there an uncertainty as to whether a date palm seed will yield a male or a female tree, but there is also the further difficulty that the seedlings only rarely resemble their parents, and it is very unlikely that a good variety will come true from seed.

In order to try and ascertain whether the Arab belief in the change of sex of the date palm might rest on any foundation, letters of enquiry were sent to Professor Trabut at Algiers and to Mr. Feilden. From Mr. Feilden several interesting particulars were obtained in the form of answers to specific questions which he put to three prominent native growers of dates in Egypt.

He also pointed out that the belief in the change of the sex of date palms does not appear to have been an ancient one since Delile, writing on Egypt in 1824, mentions that the reason why palms were not usually grown from seed was because of the uncertainty of knowing whether the seedlings would be male or female, and that for this reason propagation by offshoots was the recognised method of raising a stock of young palms.

The following questions were put to the native growers:—

1. What percentage of seedling date palms are male?

Answers: A. 66 per cent. male.

B. 33 per cent. male.

C. 33 per cent. male.

2. Is there any way by which the sex of a young date palm can be determined?

Answers: A. The leaflets, especially the lower ones, are stiffer in the males than in the females.

* *Gartenflora*, 1901, I. pp. 545-6.

B. The seedlings are covered with a light straw mat; the male seedling pushes its way through or raises the mat. The females bend sideways being weaker. In larger plants same answer as No. 1. Of seedlings planted at same time, the male grows far more quickly than the female.

C. The same answer as A.

3. Is there any way by which the young plants can be made females?

Answers: A. If the seedlings are transplanted at two years old the number of females is at least doubled.

B. Knows of no way.

C. The roots have tubercles on them. If these tubercles are removed the plant becomes female.

C. also says that if seed from dates which have been eaten is sown, the seed presumably being scraped by the teeth, more males result; if the date seed is sown uninjured the females predominate.

4. Have you ever heard of any method of tearing the leaves of the young palms to induce females?

All three growers say they have heard of no such method.

From Professor Trabut we received the following letter on the subject:—

“La légende de la transformation du dattier mâles en femelles est une légende Arabe, elle est propagée par M. le Comte de Follney propriétaire à Biskra. Je crois aucune expérience confirmative n’a été faite.

“Les Arabes opèrent sur des semis dont ils ne connaissent pas encore le sexe. Jamais cette pratique n’a été employée d’une manière courante. Donc des semis il n’ya jamais plus de 50 per cent. de mâles. Pour mettre au point cette question il faudrait prendre 100 palmiers de semis—fendre les feuilles de tous en voir si de ce fait ils deviennent tous femelles.

“Jamais on n’a parlé d’opérer sur les ‘offshoots,’ mais seulement sur les jeunes ‘seedlings,’ n’ayant pas encore porté d’organes floraux. L’opération consiste à fendre la feuille suivant le rachis qui est fendu par le milieu.

“Pour complément d’information vous pouvez écrire à M. de Follney à Biskra qui vous donnera, avec plaisir une réponse détaillée.

“Mes cordiales salutations.

“(Signed) L. TRABUT.”

Acting on Professor Trabut’s advice a letter was written to the Count de Follney in the following terms on February 14th last, but unfortunately no reply has as yet been received, and the supposed change of sex of date palms can only be regarded as a supposition believed in by the Arabs:—

“Royal Botanic Gardens, Kew,

“February 14th, 1914.

“M. le Comte,”

“J’apprends par M. le Professeur Trabut à Alger que vous vous intéressez au problème de la transformation du dattier mâle

en dattier femelle, et comme ce problème est d'un haut intérêt scientifique, j'espère que vous voudrez bien avoir l'obligeance de me donner quelques renseignements à ce sujet.

" Dès l'année 1901 le Prof. Schweinfurth a donné un compte-rendu de la coutume pratiquée par les Arabes pour obtenir ce résultat, et qui consiste à fendre les feuilles des jeunes plantes de dattier.

" Comme les détails qu'il donne au sujet de cette manipulation lui ont été fournis par vous, je viens vous demander si l'essai en a été fait, par vous ou par d'autres, d'une manière suivie et pouvant donner la valeur de cette croyance des Arabes à la transformation du sexe chez le dattier.

" Puisqu'il paraît que l'opération est faite sur de jeunes semis dont il est encore impossible de connaître le sexe, il semble que la seule manière de prouver la véracité de l'hypothèse serait de faire 2 semis d'au moins 100 graines de dattier chacun. On permettrait alors à un de ces semis de se développer normalement en prenant note de la proportion de mâles et de femelles produits. Tandis que l'on fendrait toutes les feuilles du second, selon la méthode décrite, et si toutes les plantes de ce second semis étaient constatées appartenir au sexe féminin, on aurait une preuve suffisante de l'efficacité de la méthode Arabe.

" Il se peut qu'un essai de ce genre ait déjà été fait par vous, et dans ce cas, j'espère que vous aurez la bonté de me donner autant de détails que possible sur le résultat obtenu. Si au contraire la croyance Arabe en est encore à l'état légendaire, j'espère qu'il serait possible pour quelqu'un intéressé dans la culture et la propagation du dattier de faire quelque expérience analogue à celle que j'ai indiquée.

" Veuillez m'excuser, Monsieur, de vous déranger à ce sujet et

" Recevez, je vous prie, l'expression de mes sentiments très distingués.

" (Signed) D. PRAIN,
" Director.

" M. le Comte de Follney,
" Biskra."

XXVII.—THE INTRODUCTION OF PARA RUBBER TO BUITENZORG.

The following correspondence on the subject of the date of the introduction of Para rubber to Buitenzorg from the Royal Botanic Gardens, Kew, has recently taken place between the Division for Plant Breeding at Buitenzorg and the Royal Botanic Gardens, Kew:—

" Buitenzorg, 6th March, 1914.

" Sir,—In the books of Mr. Wright on Para rubber and of Mr. Lock on Rubber and Rubber Planting reference is made of different shipments of *Hevea* seeds received at Kew. According to the authors, the first seeds arrived at Kew were probably those brought by Collins from the Amazon in 1873; another parcel was received from Cross in 1877. Mr. Lock remarks: 'Although

only a few of Cross's *Hevea* seedlings were preserved, there must be by this time a considerable number of trees growing in Eastern plantations which are directly descended from the survivors of this consignment.' The bulk of our Eastern Heveas descends of course of Wickham's plants, distributed by Kew.

"Studying the variability of our Eastern Heveas, I take much interest in the history of the old introductions. We have in the garden here two trees marked 1875, and received from Kew. It is possible that the date is incorrect, and that it ought to be 1876. Could you perhaps find in your archives in which year Kew sent its first *Hevea* plants to Buitenzorg and to which shipment they belonged, to Cross's, Wickham's or Collins's?"

"Could you give me some information about the places where Cross and where Collins gathered their seeds?"

"Faithfully yours,

"(Signed) P. J. S. CRAMER,
"Chief of Division for Plant Breeding."

"Royal Botanic Gardens, Kew,

"April 17th, 1914.

"Sir,—In reply to your letter No. 134 V. O. G., dated Buitenzorg, March 6th, 1914, I beg to inform you that in our Outwards Records there is an entry dated August 30th, 1876, which states that 18 *Hevea brasiliensis* plants were included in a Wardian case that day despatched to Dr. Scheffer, Buitenzorg. These 18 plants were raised from 70,000 seeds collected by Mr. Wickham in March, 1876, in the 'Ciringals of the Rio Tapajos,' as stated in a letter from Mr. Wickham to Dr. Hooker, dated March 6th, 1876. They were received at Kew on June 14th, 1876.

"On September 22nd, 1877, another lot of plants was despatched to Dr. Scheffer, and among them were four more plants raised from this lot of *Hevea* seeds received from Mr. Wickham.

"2. It is certain that your Buitenzorg plants, dated 1876, cannot have been raised from seeds collected by Mr. Cross, because the decision on the part of the Secretary of State for India to send Mr. Cross to the Amazon to collect *Hevea* seeds was not arrived at until March, 1876. It was communicated to Dr. Hooker at Kew on April 1st, 1876, and we know from what is said by Sir Clements Markham in his work on Peruvian Bark, pp. 458-460, and from Mr. Cross's own report that Mr. Cross collected his *Hevea* between July and October, 1876, in the neighbourhood of Para and of Marajo Island. I do not find any reference to Mr. Cross having sent or brought to Europe any seeds of *Hevea brasiliensis*. In his report he speaks of collecting plants, not seeds, *e.g.*, on August 7th and August 10th, 1876, he collected, he tells us, about 2000 in all. When he arrived at Liverpool on November 22nd, 1876, he says that there were fully 1000 plants of Para rubber. *Hevea brasiliensis*, in the best condition. He also says that they were deposited at Kew early on the morning of November 23rd (*Cross, Report*, p. 15).

"The entry at Kew, which relates to this transaction, states that there were 1080 seedling plants in Mr. Cross's consignment, that

of these 400 were retained at Kew and 680 (140 with leaves and 540 without) were handed to Mr. William Bull. In a letter to Kew dated May 11th, 1877, Mr. Bull reported that it had not been possible to save more than 14 of the Heveas, although the greatest possible care was taken of them. The result was only in keeping with the expectation formed at Kew when the plants were sent off to Mr. Bull and by Mr. Bull when he received them, 'for they had no fibrous roots but were merely tap-rooted seedlings and nearly dried up.' The result was the same with the 400 kept at Kew, only 3 per cent. of them grew. Whether a single plant brought home by Cross ever became fit to send to Asia I do not know. I cannot find any entry in our archives which could be so interpreted.

"3. I am puzzled over your two trees marked 1875 and received from Kew. It is true that in that year, 1875, Kew received a few seeds from Mr. Wickham on July 7th. He speaks of despatching them in a letter to Dr. Hooker dated April 18th, 1875. It is also true that on August 17th Kew received a few seeds from Mr. Wickham, but there is no indication that any one of these seeds germinated. It is also true that Kew got a quantity of seeds of *Hevea* from the India Office on July 16th, 1875, none of which germinated. Who collected this seed I do not know, but you will find in Dr. King's report of the Royal Botanic Garden, Calcutta, for 1875-6, an account of how he had received in September, 1875, a consignment of 378 seeds from the India Office so badly packed that none of the seed germinated. In a letter from the India Office to Dr. Hooker, dated July 16th, 1875, it is said: 'I am desired by Dr. Forbes Watson to inform you that a bag containing all that remained of these seeds was sent to your address yesterday in the hope that some may germinate, having first found it impossible to have the order for shipment of original cargo countermanded.' It is clear from this that the seed was sent to Calcutta from the India Office without Dr. Hooker being consulted, and that by the time that Dr. Hooker did know of it the consignment had already gone. The balance left over was sown at Kew as soon as it was received. But none of it germinated, so that the lot sent to Dr. King for Calcutta had probably lost its vitality before it was despatched from London. I have no doubt that it was their bad success with this shipment of 1875 that led the India Office to send out Mr. Cross in 1876.

"4. With regard to the statements that have got into various publications concerning seeds collected by Mr. Collins you will perhaps be prepared to find them as inexact as those regarding seeds collected by Mr. Cross.

"Mr. James Collins published in 1872 his Report on Caoutchouc and was much interested in the subject. On June 2nd, 1873, Dr. Hooker had a letter from Mr. Markham to say that Mr. Collins had heard about 2000 seeds of the Para Caoutchouc tree which had just arrived in England, and which he could purchase; further, that Mr. Markham had asked Mr. Collins to purchase them on behalf of the India Office. Mr. Collins on May 31st had, however, already written to Dr. Hooker to tell him that he had that morning received a letter from a Mr. Farris, late of Camela, informing him that in compliance with a request which Mr. Collins

had made to him, he (Mr. Farris) had brought to England some *Hevea* seeds which were quite fresh. There were several hundreds of these seeds collected by Mr. Farris, but when they were received at Kew and sown there, of the whole only about a dozen germinated. On September 22nd, 1873, six of the plants raised from the seeds collected by Mr. Farris and obtained from him through Mr. Collins for the India Office, were taken in a Wardian case to Calcutta by Dr. King. All of the other plants raised from these Farris-Collins seeds of 1873 were kept at Kew. It is to be seen from the Report of the Royal Botanic Garden, Calcutta, for 1873-4, that the propagation of *Hevea* from cuttings taken from the six plants taken out to India by Dr. King was at once started, and from the Royal Botanic Gardens, Kew, Report for 1875, p. 7, it is seen that at Kew it was found possible to do the same thing. But the *Hevea* did not succeed in Northern India, and I do not believe that any plants propagated by cuttings from the Farris (so-called Collins) plants ever reached Malaya from Calcutta. Nor was it necessary to continue this method of propagation anywhere after the fortunate arrival of Mr. Wickham's good seeds in 1876, so that I do not believe that any *Hevea* propagated from the Farris plants were sent to the East from Kew.

"Yours faithfully,

"(Signed) D. PRAIN,

"Director.

"Dr. P. J. S. Cramer,

"Chief of Division for Plant Breeding,

"Department van Landbouw,

"Buitenzorg, Java."

XXVIII.—HEDYCHIMUM CORONARIUM FROM CALCUTTA.

In *Kew Bulletin*, 1912, p. 373, a detailed account appeared of investigations made by Messrs. Clayton Beadle & Stevens into the possibilities of *Hedychium coronarium* as a source of material for paper-making. The experiments were made with dried material from Brazil and with fresh stems grown in the Royal Botanic Gardens, Kew. Subsequently a supply of the dried plant received from the Royal Botanic Garden, Sibpur, Calcutta, was forwarded to Messrs. Clayton Beadle & Stevens, who have examined the same to see if the plant would give similar results from different parts of the world.

The following report has been furnished by Messrs. Clayton Beadle & Stevens:—"The botanical specimens sent over from Calcutta are complete, dried-down specimens, whereas the *Hedychium coronarium* examined from Brazil was in the form of crushed fibre produced by passing the green, freshly cut stems through sugar rollers to express the juices, prior to drying for shipment. This in itself constitutes an important difference. We had our doubts whether complete specimens in the dried-down condition could be rendered serviceable in the manufacture of paper

because the complete specimens from Brazil had undergone fermentation. In the condition as sent from Brazil, however, we believe that they were packed in a green state, whereas those sent from Calcutta were presumably carefully dried before packing. We have recently cut down a green *Hedychium* stem and passed it through crushing rollers, and we find that of the dry weight in the complete green stem there is 23 per cent. of organic matter contained in the juices and 77 per cent. of dry crushed material. These juices are of an acid nature and have a powerful reducing action upon Fehling solution, and it is to the presence of these juices in the green stems as sent from Brazil that we attribute its destruction in transit. The dried-down specimens from Calcutta do not appear to have suffered from any putrefactive changes, due—we presume—to the fact that they were completely dried before packing.

“The Calcutta specimens were boiled with 10 per cent. (of 77 per cent.) caustic soda for four hours at $2\frac{1}{2}$ atmospheres, washed free of liquor and lightly brushed for three hours in a hollander, then made into paper without any added sizing material.

The soda consumed on the raw material ... = 6.0%

“ ” ” on paper ... = 18.0%

The yield of unbleached paper on raw material = 32.5%

This on a basis of 77 per cent. crushed fibre would yield 43 per cent. of paper on the weight of the crushed fibre. Brazilian crushed fibre yields under similar circumstances 50 per cent. unbleached paper. The sheets of paper produced from the Calcutta fibre were examined in different thicknesses and substances, and yielded the following figures for bursting strain:—

Thickness in mm.	Substance grms. per sq. m.	lb. Demy.	Bursting strain in lbs. per sq. in.
.10	80	21	26
.13	110	30	53
.14	115	31	55
.28	230	62	105

These figures are satisfactory. The material boils down readily, it is easily beaten to the condition of pulp, requiring comparatively little power; it drains well and felts well when made into paper, and has a good wet strength after couching, and there should be no difficulty in manipulating it upon the paper machine.

“The ‘Waterleaf’ is not ink-proof as that produced from the Brazilian fibre is, but this is probably due to the fact that whole specimens sent home dried down contain juices which probably had some effect upon those natural constituents (pith cells) which give to the *Hedychium* fibre these peculiar self-sizing qualities.

“We think this statement is probably true, because *Hedychium* green stems from Kew, Paris, and elsewhere, have shown self-sizing qualities if crushed to remove the juices and immediately used, or if the crushed material had been dried down for shipment after the removal of the juices. The above paper is of a good kraft colour with a strong tear and a rattle and should be very serviceable for ordinary wrapping papers. It is elastic, has a good breaking strain and bursting strain and possesses good folding and wearing qualities. We are disposed to conclude that *Hedychium*

coronarium will yield good paper-making qualities from whatever part of the world it is gathered, and that any differences in the qualities of the above-mentioned material from Calcutta as compared with that from Brazil (which latter we have thoroughly investigated) are to be attributed to differences in the preparation of the raw fibre prior to shipment rather than to any difference in the growth of the plant itself."

XXIX.—DIAGNOSES AFRICANAE: LIX.

1501. *Crassula clavata*, N. E. Brown [Crassulaceae]; species ab omnibus distinctissima foliis rhomboideo-clavatis, floribus capitatis, petalis apice dorso appendiculis oblongo-ovoideis carnosus instructis.

Herba nana, succulenta, acaulis. *Folia* omnia radicalia, opposita, in rosulam 3-4 cm. diametro dense conferta, 1-2 cm. longa, 6-9 mm. lata, 5-8 mm. prope apicem crassa, rhomboideo-clavata, obtusa, supra plana, apice oblique subtruncata, subtus valde convexa, glabra, viridia, leviter glauca, punctata. *Pedunculi* 3 cm. longi, 1.5 mm. crassi, erecti, minute puberuli, rubri, prope apicem bracteis duabus oppositis deltoideis 2-3 mm. longis instructi. *Flores* sessiles, in capitulum 1.3 cm. diametro dispositi. *Bractee* 2-2.5 mm. longae, lineares, obtusae, glabrae, ciliatae. *Sepala* 1.75-2 mm. longa, linearia, obtusa, ciliata. *Petala* 5-6, erecto-conniventia, fere 3 mm. longa, basi connata, superne spathulata, lamina rhomboideo-ovata, subacuta, dorso infra apicem appendiculo carnosio ovoideo-oblongo erecto instructa, alba. *Stamina* 5-6, corollae tubo inserta. *Glandulae hypogynae* minutae, clavatae, pulchre aurantiacae. *Carpella* 5-6; styli brevissimi.

SOUTH AFRICA. Prince Albert Division: without precise locality, *Pearson*.

Described from a living plant sent to Kew by Prof. Pearson in 1912.

1502. *Mesembryanthemum fulviceps*, N. E. Brown [Ficoideae-Mesembryeae]; affine *M. Lesliei*, N. E. Br., sed fissura inter folia multo profundiore et apicibus foliorum fulvis maculis parvis rotundatis atroviridibus notatis bene distinguitur.

Herba succulenta, perparva, acaulis. *Folia* 2, in corpusculum ultra medium connata. *Corpuscula* subsolitaria vel subcaespitosa, 2.5-4.5 cm. longa, obconica, apice 2.5-2.8 cm. lata, truncata, fissuris transversis notata, laevia, glabra, fulva, maculis parvis rotundatis sordide atroviridibus notata, lateribus leviter purpureo-cinerascentibus opacis; fissura 7-8 mm. profunda. *Flores* ignoti.

SOUTH AFRICA. Great Namaqualand: Great Karasberg Region, *Pearson*.

This plant was collected by Professor H. H. W. Pearson during the Percy Sladen Memorial Expedition to the Great Karasberg Range, and sent to Kew in the Spring of 1913. As, from a want of sunshine, these plants do not flower freely in this country, and as this species may possibly die out of cultivation without flowering, I have deemed it better to publish a description of it. In size

and form it is much like *M. Lesliei*, N. E. Br., but the much deeper fissure separating the tips of the leaves and the peculiar tawny colour of their truncate tips, marked with small round dull dark green dots, readily distinguishes it from that species, which also comes from a far distant locality in the Transvaal.

1503. **Ceropegia abinsica**, N. E. Brown [Asclepiadaceae-Ceropegieae]; affinis *C. campanulatae*, Don, sed foliis latoribus, corollae tubo extra sparse piloso-pubescente immaculato et lobis duplo angustioribus intra glabris facile distinguitur.

Herba perennis, erecta, tuberosa. *Tuber* discoideum 2-3 cm. diametro. *Caulis* erectus, simplex vel ramosus, 9-50 cm. altus, 2 mm. crassus, puberulus. *Folia* patula vel subhorizontalia, subsessilia vel brevissime petiolata, 6-12 cm. longa, 2.5-6 mm. lata, linearia, acuta, basi rotundata vel subcordata, supra glabra, subtus costa marginibusque scabra. *Flores* pauci, solitarii, ad nodos laterales vel terminales, erecti vel adscendentes. *Pedunculi* 1-2 cm. longi, breviter pubescentes. *Sepala* 4 mm. longa, attenuato-subulata, minute puberula. *Corollae* tubus rectus 2.5-3.2 cm. longus, basi inflatus, medio cylindricus, apice infundibuliformis et 0.9-1.1 cm. diametro, extra breviter et tenuiter piloso-pubescent, intra glaber, virescens, immaculatus; lobi 2.5-3.5 cm. longi, 0.5 mm. lati, erecti (vel contorti?), apice connati, e basi deltoideo anguste lineares, replicati, marginibus ciliatis, intra glabri. *Corona exterior* 10-dentata; dentes 1 mm. longae, subulatae, apice barbatae, atro-purpureae. *Coronae interioris* lobi 2 mm. longi, connivento-erecti, apice leviter recurvi, lineares, apice leviter dilatati, glabri.

TROPICAL AFRICA. Northern Nigeria: not uncommon in the bush at Abinsi, July 21st, 1912, *Dalziel* 690.

Metaporana, N. E. Brown [Convolvulaceae-Convolvuleae]; genus novum affine *Poranae*, Burm., sed calycis lobis immutatis, corollae lobis patentissimis et capsula e calyce longe exserta differt.

Sepala aequalia, fructu immutata. *Corolla* ultra medium 5-loba; tubus subcylindricus calyce aequilongus; lobi induplicato-valvati, patentissimi. *Stamina* 5, exserta, tubo corollae affixa; filamenta filiformia; antherae elliptico-oblongae, dorsifixae. *Orarium* 2-loculare; loculi 2-ovulati; styli 2 vel stylus fere ad basin bipartitus; stigmata capitata. *Capsula* parva, subgloboso-ovoidea, apice conica, e calyce longe exserta, 4-valvis, 2-4-sperma. *Semina* subangulato-ellipsoidea, glabra.—*Frutices* volubiles. *Folia* alterna, ovata vel oblonga. *Flores* parvi, in cymas vel paniculas axillares vel terminales dispositi.

Of the two species belonging to this genus, one is new and the other has been placed in the genus *Porana*, from which the unchanged calyx and much exerted capsule at once distinguish it. The habit of the plants and texture of the calyx and corolla are also different from that of *Porana*. Both are evidently nearly related, but may be readily distinguished by the following characters:—

Leaves ovate, acute, acuminate or obtuse, with
petioles 0.5-2 cm. long; styles 2, with very

large stigmas *M. densiflora*

Leaves oblong, obtusely rounded or emarginate at the apex, with petioles 1.5–3 mm. long; style divided nearly to the base, with very small stigmas *M. angolensis*

1504. **Metaporana densiflora**, *N. E. Brown*.—*Porana densiflora*, Hallier f. in Engler Bot. Jahrb. vol. xviii, p. 93; Baker and Rendle in Fl. Trop. Afr. vol. iv, sect. 2, p. 85.

TROPICAL AFRICA. Uganda: on plains below Butaiba, Lake Albert, *Dawe* 816; Busoga, *Brown* 369. British East Africa: between Mombasa and Witu, *Whyte*; between Mombasa and Takaunga, *Whyte*. German East Africa: Usambara; Buiti, *Holst* 2379; Duga, *Holst* 3205.

1505. **Metaporana angolensis**, *N. E. Brown*. *Frutex* scandens. *Rami* graciles, minute adpresse puberuli. *Folia* alterna, subglabra vel tenuissime adpresse puberula; petiolus 1.5–3 mm. longus; lamina 1–4 cm. longa, 0.4–1.5 cm. lata, oblonga, apice obtusissima vel emarginata, basi rotundata, subcordata vel subtruncata. *Cymae* vel *paniculae* axillares vel terminales, pedunculatae, pluriflorae. *Pedunculi* 0.3–1.8 cm. longi, graciles, subglabri vel minute adpresse puberuli. *Bractee* minutae, 1–1.5 mm. longae, lanceolatae, adpresse puberulae. *Pedicelli* 2–3 mm. longi. *Sepala* 2 mm. longa, 1.5–2 mm. lata, elliptica, apice obtuse rotundata, subcoriacea, subglabra vel sparse adpresse puberula. *Corolla* 7 mm. diametro, alba; tubus 2 mm. longus, subcylindricus; lobi 3 mm. longi, 2–2.5 mm. lati, elliptici, obtusi, patentissimi, dorso vitta lata adpresse puberula instructi. *Stamina* exserta; filamenta 2 mm. longa; antherae 1 mm. longae. *Orarium* ellipsoideum, apice penicillato-pilosum; stylus fere ad basin bipartitus, 4–4.5 mm. longus, glaber; stigmata minuta, capitata. *Capsula* subglobosa, apice conica, 3.5–4 mm. longa et lata, e calyce longe exserta, glabra. *Semina* 2–2.5 mm. longa, minutissime punctata, fusca.

TROPICAL AFRICA. Angola: near the Mossamedes Railway at between km. 106.5 and 108.5, *Pearson* 2388, 2391, 2813, 2903.

1506. **Acrocephalus tiramosus**, *N. E. Brown* [Labiatae-Ocimoideae]; affinis *A. succisaefoliae*, Baker, sed caulibus deflexo-pilosis et bracteis infra capitulas magnis foliiformibus conspicue differt.

Herba 20–30 cm. alta, forsan tuberosa, caulibus tribus. *Caules* (vel internodia) 15–16 cm. longae, tiramosae, ramis 3–10 cm. longis tricapitatis, deflexo-pilosae. *Folia* pauca, subsessilia, 6–15 cm. longa, 0.7–2.2 cm. lata, anguste oblonga vel anguste lanceolato-oblonga, acuta, basi cuneata, subintegra vel obscure dentata, utrinque sparse pubescentia. *Capituli* pedunculis 0.3–1.8 cm. longis deflexo-pilosis suffulti. *Bractee* infra capitulas foliis similes, 2–6 cm. longae, 0.4–2 cm. latae; bractee florentes 5–7 mm. longae, 4–6 mm. latae, late ovatae, abrupte acuminatae. *Calyx* 1.75 (fructu 4–5) mm. longus, bilabiatus, adpresse pilosus, labiis integris rotundatis. *Corolla* 5 mm. longa, coerulea; tubus rectus, glaber; labium superum 3-lobum, 2 mm. longum, lobo intermedio breviter bifido dorso piloso; labium

inferum vix 2 mm. longum, oblongum, obtusum, concavum. *Stamina* vix exserta.

TROPICAL AFRICA. Angola: on the high plateau near Humpata, 1850 m., *Pearson* 2664.

1507. *Aeolanthus lobatus*, *N. E. Brown* [Labiatae-Oci-moideae]; affinis *A. pinnatifido*, Hochst, sed spicis longioribus et laxioribus, floribus minoribus et bracteis aristato-acuminatis bene distinguitur.

Herba circa 30 cm. alta, ramosa, ramis adscendentibus minutissime puberulis. *Folia* opposita, petiolata, pinnatisecta, 1.5-4 cm. longa, 0.6-2 cm. lata, subglabra, lobis linearibus vel lineari-spathulatis obtusis. *Paniculae* terminales; rami 2.5-10 cm. longi, erecti, secundiflori. *Flores* sessiles. *Bractee* 3-5 mm. longae, lanceolatae vel ovato-lanceolatae, longe aristato-acuminatae, minute glanduloso-puberulae. *Calyx* 1.5 mm. longus, campanulatus, truncatus, obscure 5-crenatus, minutissime glanduloso-puberulus, fructu clausus. *Corolla* glabra, alba, labio infero apice purpureo; tubus 3.5-4 mm. longus, rectus, apice dilatatus, compressus; labium superum erectum, truncato-bilobum, lobis 2 mm. longis deltoideo-lanceolatis acutis horizontaliter divergentibus; labium inferum 6-7 mm. longum, rectum, compresso-concavum, obtusum. *Stamina* 4, apice incurva, 4-5 mm. longa, 2 inferiora basi connata, 2 superiora libera. *Stylus* staminibus longior, apice bifidus. *Nucleae* compressae, suborbiculares, laeves, nitidae.

TROPICAL AFRICA. Angola: open ground near the Mossamedes railway at km. 107, *Pearson* 2643.

1508. *Anthericum acutum*, *C. H. Wright* [Liliaceae-Asphodeleae]; species *A. pachyphylllo*, Baker, affinis, foliis longe et anguste acuminatis, bracteisque longe cuspidatis differt.

Folia lineari-lanceolata, longe angustaque acuminata, basi vaginantia, minute scabridula, minutissime serrulata, 34 cm. longa, 1 cm. lata. *Pedunculus* cylindricus, circa 45 cm. longus, paucibracteatus; racemus 20 cm. longus; bractee e basi ovata longe cuspidatae, infimae 2.5 cm. longae, superiores gradatim minores. *Perianthium* album; segmenta oblonga, 17 mm. longa, 5 mm. lata, costa 1 mm. lata viridi trinervia instructa, exteriora apice callosa. *Filamenta* complanata, 6 mm. longa; antherae 4 mm. longae, loculis basi divergentibus. *Ovarium* oblongum, trilobum; stylus staminibus superans, sursum gradatim incrassatus.

SOUTH AFRICA. Natal: Ensikeni, 1220 m., *W. J. Haygarth* in *Herb. Wood*, 12,063.

1509. *Fuirena cristata*, *Turrill* [Cyperaceae-Scirpoideae]; affinis *F. cinerascens*, Ridley, sed foliis brevioribus, petalis majoribus apice cristatis mucronatis praecipue differt.

Rhizoma horizontale, crassum, usque ad 8 mm. diametro. *Culmi* erecti, usque ad 2.5 cm. longi, teretes, sulcati, basi vaginis bifidis obtecti, superne patenter hirsuti, inferne leviter pubescentes vel glabri. *Folia* ovato-lanceolata, lanceolata vel lineari-lanceolata, apice acuta, usque ad 4 cm. longa et 7 mm. lata, nervis parallelis

numerosis pagina utraque subprominentibus, plus minusve hirsuta, vaginis integris hirsutis. *Spiculae* 7-8, aggregatae, ellipsoideo-cylindricae, usque ad 7 mm. longae et 2.75 mm. latae, multiflorae. *Glumae* obovatae, 3.5 mm. longae (mucro 1.5 mm. longo plus minusve recurvo excluso), 2 mm. latae, extra hirsutae, intus glabrae, trinerviae. *Sepala* 3, minima, setosa, 0.5 mm. longa. *Petala* 3, ovata, stipitata, apice cristata, in flore maturo crista late biloba circiter 0.5 mm. longa 0.6 mm. lata mucronata ciliata inclusa 2 mm. longa, 1 mm. lata, trinervia, ciliata. *Stamina* 3, filamentis gracilibus 1 mm. longis, antheris linearibus 1.25 mm. longis. *Ovarium* trigono-ellipsoideum, stipitatum, 0.75 mm. longum, 0.4 mm. latum, album, glabrum. *Stylus* cum ramis tribus 3 mm. longus. *Nux* ovata, stipitata, acute trigona, apice acuminata, stipite 0.5 mm. longo incluso 1.75 mm. longa, glabra, pallide straminea.—*F. calolepis*, K. Schum. in Baum, Kunene-Sambesi Expedition 179, non in Abh. Preuss. Akad. Wiss. (1894) 20 et 21 nec in Engl. Pflanzenw. Ost-Afr. C (1895) 126.

TROPICAL AFRICA. Kunene-Sambesi Expedition: Habungu, 1150 m., *H. Baum* 472. Benguella, country of the Ganguellas and Ambuellas, *Gossweiler* 2204, 2166.

1510. *Mariscus laxiflorus*, *Turrill* [Cyperaceae-Scirpoideae]; affinis *M. leptophyllo*, C. B. Clarke, sed culmis foliorum vaginis membranaceis inferne ad partem dimidiam tertiamve haud vestitis, inflorescentiae radiis longioribus differt.

Rhizoma horizontale, breve. *Culmi* erecti, usque ad 4.5 dm. alti, 1-1.25 mm. diametro, indistincte triangulares, glabri, ima basi incrassati, foliorum vaginis membranaceis haud conspicue obtecti. *Folia* linearia, apice acuta usque ad 1.3 dm. longa et 2.5 mm. lata, tenuiter serrata, glabra; vagina integra, glabra. *Inflorescentia* umbellata, radiis usque ad 8 cm. longis; bractae foliis similes usque ad 1.2 dm. longae. *Spiculae* late lineares, 6-9 mm. longae, 2.5 mm. latae, 3-6-florae. *Glumae* vacuae ad spiculae basem duae, inferiore plus minusve anguste lineari, superiore ovata; glumae fertiles 3-6, late ovatae, apice obtusae, 3 mm. longae, 2.5 mm. latae, glabrae, nervis lateralibus circiter 8 conspicuis. *Stamina* 3, filamentis gracilibus 1.3 mm. longis, antheris linearibus 0.75 mm. longis. *Stylus* cum ramis tribus 3.25 mm. longus, basi persistente leviter incrassatus. *Nux* oblongo-ellipsoidea, acute trigona, circiter 2.25 mm. alta, 1.25 mm. diametro, brunnea.

TROPICAL AFRICA. Angola: Benguella, country of the Ganguellas and Ambuellas, *Gossweiler* 3723.

XXX.—MISCELLANEOUS NOTES.

MR. ARTHUR WILLIAM MAYNARD, a member of the gardening staff of the Royal Botanic Gardens, Kew, has been appointed, on the recommendation of Kew, Gardener at the National Botanic Gardens, Kirstenbosch, Cape Town, South Africa.

MR. ROBERT SERVICE, a member of the gardening staff of the Royal Botanic Gardens, Kew, has been appointed on the recom-

mentation of Kew, Horticultural Superintendent in the Department of Science and Agriculture in the Colony of British Guiana.

MISS J. J. CLARK.—Kew has sustained a great loss through the untimely death of Miss J. J. Clark, of the Herbarium staff, which occurred on February 2nd, 1914, after a long illness.

Miss Clark, who was born on August 25th, 1881, was educated at Southend High School, and afterwards for four years at University College, Aberystwith, where she gained the B.Sc. degree of London University with first-class honours. After leaving college, she held the post of science mistress at her old school, and subsequently accepted a post as private secretary to a man of letters.

In November, 1909, she was appointed by the Board of Agriculture and Fisheries a Lady Assistant in the Herbarium at Kew after limited competition. During the short time she was a member of the Kew staff Miss Clark proved herself a careful and trustworthy worker, and took an unfailing interest in both the official and social life of the Gardens. In the "*Annals of Botany*," vol. xxvi. 1912, p. 948, she published an interesting note on "*Abnormal Flowers of Amelanchier spicata*." Other publications were diagnoses of new species, chiefly from Tropical Africa (*Kew Bull.* 1911, pp. 229, 263; 1913, pp. 76-77), and descriptions of plants figured in the *Botanical Magazine* (vols. 138, 139, 1912-13).

Although it was known that Miss Clark was very seriously ill, her untimely end at the early age of 32 came as a shock to her colleagues, and she leaves them with a keen sense of the loss of a helpful and cheery personality. To those who knew her best her patience and courage under the trials of failing health will always be a reverent memory.

E. M. W.

DR. JACQUES HUBER.—It is with great regret that we have to record the sudden death of Dr. Jacques Huber, Director of the Museum Goeldi, Para, on February 18th, in that city. He went to Para in the year 1895, and was made Director of the Botanical Section of the newly-reorganised State Museum of Natural Science and Ethnography (now Museu Goeldi). Here he laid out the botanic garden and undertook numerous scientific journeys into different parts of Brazil, the results of which added considerably to our knowledge of the Brazilian flora. In addition to his general botanical and geographical studies he had an extensive knowledge of Para rubber and its cultivation, and many of his articles on *Hevea* and other rubber plants were published in the Bulletin of the Herbar Boissier. In March, 1907, when Dr. Goeldi returned to Europe, Dr. Huber was appointed Director of the Goeldi Museum.

The Lawrence Orchid Collection.—It is well known that the orchid collection of the late Sir Trevor Lawrence, Bart., K.C.V.O., Burford Lodge, Dorking, was very rich in rare and interesting species, Sir Trevor having paid special attention to them for a

great many years. He had an eye for anything that was quaint or interesting in structure, quite independent of its decorative value, the result being that the collection was not only thoroughly representative of the usual showy species and hybrids, but also possessed examples of most of the cultivated genera, some of which are seldom met with, and there were plants from almost every quarter of the globe, and possessing the most diverse cultural requirements. At his death the whole of the plants were bequeathed to his wife, with the desire that she would present to the Royal Botanic Gardens, Kew, such portions of the collection as she might be advised or might consider to be primarily of botanical interest, the matter being left entirely to her decision. Some time ago Lady Lawrence wrote to the Director informing him of her pleasure in carrying out Sir Trevor's wishes, and a large selection, consisting of about 580 plants, belonging to upwards of eighty genera, has now been received. The gift forms a very valuable addition to the Kew collection, and is rich in such genera as *Bulbophyllum*, *Cirrhopetalum*, *Pleurothallis*, *Maxillaria*, *Epidendrum*, *Eria*, *Angraecum*, *Dendrobium* and *Coelogyne*, and there are many species not previously represented at Kew, and some that are very rarely seen in cultivation. The genera not previously represented in the collection include *Trichocereos*, a high Andine genus very difficult to get home alive and very difficult to cultivate afterwards, *Nasonia* and *Quekettia*, two small American genera, and *Stereochilus* and *Sigmatogyne* from North India. The collection also includes a number of undetermined species which have not yet flowered, and of which the genus is in a few cases still doubtful. These have been obtained from various sources, a few of them having been sent from West Africa by Sir Trevor's son, Captain C. T. Lawrence. In many cases the source is indicated on the labels, and it is hoped to determine them as they flower.

The Crossland Collection of Fungi.—A valuable addition to the already extensive mycological collection in the herbarium has been made through the purchase of the series of drawings and specimens of British fungi belonging to Mr. C. Crossland, of Halifax. The drawings, representing 543 species, mostly Discomycetes, are especially welcome. There is a coloured representation of each species, natural size, accompanied by sections, dissections and spore measurements; also a detailed description, critical notes, etc., and in each instance by the specimens from which the figures and descriptions were drawn.

The general collection of fungi, numbering 2000 species, is in an excellent state of preservation, and embraces representatives of every group of British fungi. There are also some 84 myxomycetes.

The large Tulip Tree at Kew.—On Monday, March 16th, the fine old Tulip Tree which stood at the north end of the Rhododendron Dell was uprooted by the great gale of that day. The tree first began to show evidences of declining vigour about twenty

years ago, and latterly its roots have been attacked by a fungoid parasite. This, together with the softening of the earth due to the excessive rainfall in early March, reduced its hold of the ground so much that when the storm reached its climax about 11.15 a.m., it fell with a crash, its great limbs snapping like carrots. Its loss is a great one for Kew, for although not the largest, it was one of the largest trees in the British Isles, and, from the position it occupied, the most famous. Its measurements, taken as it lay on the ground, were: height, 80 feet; spread of branches, 64 feet; girth of trunk at 5 feet from base, 10 feet. At 15 feet from the ground, just below the first branches, the trunk girthed 15 feet 3 inches. Its age, computed from the annual rings, was about 150 years. It was, therefore, planted in the early years of the reign of George III. It grew, of course, on what were the Richmond Gardens, made so famous by Queen Caroline, queen of George II., and it was evidently planted during the many alterations made by her grandson and Capability Brown (including the formation of the Hollow Walk or Rhododendron Dell) soon after his accession in 1760. There is a good engraving of the tree in the Gardeners' Chronicle of August 23rd, 1890, p. 219. Two good-sized Tulip trees and several smaller ones remain in Kew. One of the former stands in the Azalea Garden, the other in the garden of Cambridge Cottage.

Botanical Magazine for May.—The plants figured are *Abies magnifica*, A. Murray (t. 8552); *Zephyranthes cardinalis*, C. H. Wright (t. 8553); *Mazus reptans*, N. E. Brown (t. 8554); *Lonicera Ledebourii*, Eschscholtz (t. 8555), and *Pithecoctenium cynanchoides*, DC. (t. 8556).

The *Abies* is a handsome species from the north-western United States, where it is a dominant tree in the forest belt of the Sierra Nevada, between 6000 and 9000 feet above sea level, extending northwards into the Cascade Mountains in Oregon. It was first introduced into the British Islands in 1851, and now some fine specimens are met with, especially in Scotland. The figure was prepared from material supplied by Mr. H. Clinton Baker, in whose fine pinetum at Bayfordbury there is a tree over sixty feet high, with a trunk about six feet in girth. From *A. nobilis*, Lindl., with which it has been very much confused, it may be distinguished by the leaves, which are keeled on both surfaces, whereas in *A. nobilis* they are grooved on the upper surface.

Zephyranthes cardinalis is an ornamental new species allied to *Z. concolor* Benth. and Hook. f., differing from it in the shorter pedicels, shorter narrowly tubular spathe, and bright red perianth. It is not known in what part of America the plant is indigenous. A bulb reached Kew through Mr. J. G. Baker, who received it from Mr. E. S. Miller, of Wading River, New York. Mr. Miller obtained the plant from the Bahama Islands, where it is grown in gardens.

The *Mazus*, a new species from the Himalaya, has been confused with *M. rugosus*, Lour., under which name it appeared in cultivation last year. Its introduction is due to Mr. B. Crisp, of the

Wargrave Plant Farm, Limited, who presented to Kew the plant from which the figure was prepared. It is a small perennial herb with prostrate stems, opposite more or less lanceolate toothed leaves, and few-flowered racemes. The unequally 2-lipped corolla is purplish-blue, the lower lip blotched with white, yellow, and red-purple. It has some resemblance to the smaller *Lobelias*.

Lonicera Ledebourii is a Californian species which has been in cultivation in the British Islands since 1838, and being an easily grown attractive plant it is now widely spread in gardens. It resembles, especially in the involucre, the well-known *L. involucrata*, Banks, which, however, may be easily distinguished from it by its thinner glabrous or nearly glabrous leaves and longer stamens.

The genus *Pithecoctenium* is one of the best characterised members of the *Bignoniaceae*, easily recognised by the capsule, which is variously muricate or tuberculate outside, and is terminated by a capitate appendage of the septum. *P. cynanchoides* is an attractive climbing shrub having a rather wide distribution in Eastern South America, where it is known from the neighbourhood of Rio de Janeiro in Brazil, from Paraguay, Uruguay, and the north-west of the Argentine Republic. It has been grown at Kew since 1884, when seeds were presented by Dr. Dormer, but flowers were not produced till 1895. The corolla is tubular funnel-shaped, $1\frac{3}{4}$ -2 inches long, white, with the inside of the tube yellow.

Asiatic species of *Sageretia*.—A useful revision of the Asiatic species of *Sageretia* is contributed by C. K. Schneider to Sargent's *Plantae Wilsonianae*, part 4, pp. 226-231, published March 24, 1914. Schneider has inadvertently re-described under new names two Chinese species published in *Kew Bulletin*, 1908, pp. 14-15. *Sageretia apiculata*, C. K. Schneider, l.c. 231, is a synonym of *S. gracilis*, J. R. Drumm. et Sprague (founded on the same numbers of Henry); and *S. Cavaleriei*, C. K. Schneider, l.c. 228, is synonymous with *S. Henryi*, J. R. Drumm. et Sprague, according to specimens (Henry, 7118 and 11240) referred by Schneider to his *S. Cavaleriei*.

J. R. D. and T. A. S.

***Hedychium coronarium* in British Guiana.**—The following extract is taken from a letter received from the Director, Science and Agriculture Department, Georgetown, British Guiana, to Director, Royal Botanic Gardens, Kew, dated March 13th, 1914, and is of interest in showing the successful results which have been obtained from the experimental planting of *Hedychium coronarium* in British Guiana:—

“The first planting of *Hedychium coronarium* has produced 28 tons of stalk and leaves per acre as a five months' crop on dry land. On irrigated land (rice) the first trials have failed. On the tidal parts of the rivers above the brackish water sections the *Hedychium* grows on swampy land submerged twice in every twenty-four hours with great vigour, the stems attaining a length of 6 feet 6 inches as compared with from 2 feet 6 inches to 3 feet on dry soil.”

A Beech Disease.—In a report on the Beech Coccus published in the *Kew Bulletin** in 1911, reference was made to a disease of the beech, which renders the trunk liable to break off at a height of from 15 to 20 feet from the ground. In trees affected in this way, the weakness of the stem in the region referred to is due to a fungal disease of the wood, which proves to be partially decayed for some distance above and below the fracture. The fructifications of two fungi were specially noted in the same region of diseased trees which had broken in this way. These were *Nectria ditissima*, Tul. and *Polyporus adustus*, Fr., and the disease was provisionally attributed to the *Nectria*.

A paper† has recently been published giving the results of some observations and experiments in connection with this disease. The conclusion arrived at in the paper is that the disease is probably caused by *Polyporus adustus*.

Spore infections have not yet been made, but infection of the wood was obtained by inserting mycelium in artificial wounds reaching the sap-wood. The fungus is thus shown to be capable of growing as a wound-parasite.‡

Various cultures were made from mycelium from the diseased wood of trees showing the characteristic fracture, and the cultures were found to be similar to those obtained from pure *Polyporus adustus*. A study was also made of the enzymes in mycelium grown from diseased wood. Diastase, invertase, tyrosinase and emulsin were found, but curiously enough the presence of cytase could not be determined experimentally.

Fructifications of *Polyporus adustus*, apparently mature, on beech were examined, but basidiospores were not found in them, though some of these spores were seen in young encrusting fructifications.

The curious phenomenon of the snapping of the trunk at a fairly uniform height is discussed, and one of the possible explanations suggested is as follows.§ Given the tapering form of the trunk, the strain on the latter, due to the action of wind on the crown, might cause incomplete rupture in the form of a crack at a definite height, and this might lead to infection at the same height, *i.e.*, through the crack.

As the disease is rather a serious one, it is desirable that further investigations should be made, including experimental work on spore-infection, and a study of any data which may throw light on the mode and causes of infection.

* Boodle and Dallimore, Report on Investigations made regarding "Beech Coccus." *Kew Bull.* 1911, p. 332.

† Elsie M. Prior, Contributions to a knowledge of "the Snap-Beech" Disease. *Journ. Econ. Biology*, vol. viii. (1913), pp. 249-263, with two plates.

‡ It had previously been suspected of having parasitic tendencies (Massee, *Diseases of Cultivated Plants and Trees*, p. 387).

§ The suggestion made by Boodle and Dallimore (*loc. cit.* p. 343) was that subburn after thinning of the trees might be the injury responsible for the entry of the fungus concerned.